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Hypersonic and planetary entry flight mechanics

A LIGHT-WEIGHT INFLATABLE HYPERSONIC DRAG DEVICE FOR PLANETARY ENTRY ... California

Institute of Technology ABSTRACT The author has analyzed the use of a light-weight inflatable hypersonic drag device, ... flight in planetary atmospheres, for entry, aerocapture, and aerobraking. Studies to date include missions to Mars, Venus, Earth, Saturn ...

A LIGHT-WEIGHT INFLATABLE HYPERSONIC DRAG DEVICE FOR

ANALYTICAL ASSESSMENT OF DRAG-MODULATION TRAJECTORY CONTROL FOR PLANETARY ENTRY ... the hypersonic and supersonic variations in drag coefficient for blunted cones.¹⁷ While Barbera's ... systems for planetary entry.²⁰ Consider an entry vehicle capable of discrete-event drag-modulation

AAS 15-748 ANALYTICAL ASSESSMENT OF DRAG-MODULATION

Description. The recent interest in hypersonics has energized researchers, engineers, and scientists working in the field, and has brought into focus once again the need for adequate ground test capabilities to aid in the understanding of the complex physical phenomenon that accompany high-speed flight.

Advanced Hypersonic Test Facilities - arc.aiaa.org

hypersonic cruise vehicles, and planetary aerocapture /entry vehicles). Characterization of surface heating on complex shapes and deflected control surfaces and fluid dynamic phenomenon, such as flow separation

Hypersonic Boundary/Shear Layer Transition for Blunt to

Taken as a whole, this book is a comprehensive and self-contained treatment of hypersonic flight trajectories and atmospheric entry flight mechanics, leading the reader through the classical theories and ending with our modern, unified theory.

Hyper Sonic Planetary Entry Flight Mechanics - Scribd

hypersonic flows are crucial to the design and safety of planetary entry vehicles. Since turbulent heat transfer rates can be up to five times higher than laminar heating rates, reduction in the weight of thermal protection systems can be realized with an improved understanding of the physics ...

Hypersonic Transition to Turbulence - NAS Home

The equations of flight, and the performance in extra-atmospheric flight are discussed along with the return to the atmosphere, and the entry. Solutions of the exact equations using directly matched asymptotic expansions are presented.

NASA Technical Reports Server (NTRS) - Hypersonic Flight

New PDF release: Hypersonic and planetary entry flight The book treats hypersonic flight trajectories and atmospheric entry flight mechanics in light of their importance for space shuttle entry.

Hypersonic And Planetary Entry Flight Mechanics

(2017) Hypersonic entry vehicle state estimation using nonlinearity-based adaptive cubature Kalman filters. Acta Astronautica 134 , 221-230 Online publication date: 1-May-2017.

Dispersion Analysis in Hypersonic Flight During Planetary

Supersonic and Hypersonic Entry Vehicle AerodynamicsEntry Vehicle Aerodynamics ... Role of NASA planetary entry aerodynamics team 1) Using computational and experimental assets, understand and model the aerodynamic forces and moments that will act upon a vehicle during entry and descent, down to ... Hypersonic \pm , deg -11.18 0 0 0 ...

01-07 Supersonic and Hypersonic Entry Vehicle Aerodynamics

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AAE 590: Hypersonic Performance and Design Course Syllabus - Spring 2013 - 3 credit hours Instructor Dr. Michael Grant, Assistant Professor ... Dynamics of Atmospheric Re-Entry, AIAA Education Series, 1993. Bryson and Ho, Applied Optimal Control, Taylor and Francis Group, 1975. ... Model hypersonic trajectories for various missions.

AAE 590: Hypersonic Performance and Design

The second-order theory of Loh for entry trajectories is presented along with the classical theories of Yaroshevskii and Chapman for entry into planetary atmospheres, and the thermal problems encountered in hypersonic flight are analyzed.

Hypersonic and planetary entry flight mechanics

Challenges to computational aerothermodynamic (CA) simulation and validation of hypersonic flow over planetary entry vehicles are discussed. Entry, descent, and landing (EDL) of high mass to Mars is a significant driver of new simulation requirements. These requirements include simulation of large

Challenges to Computational Aerothermodynamic Simulation

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The Planetary Entry Systems and Synthesis Tool (PESST) ... This framework has the capability to estimate the performance and mass of an entry system using user-defined geometry, hypersonic aerodynamics, flight mechanics, thermal response, and mass estimation. ... Planetary Entry System Synthesis Tool (PESST) Richard Otero, Michael Grant, Brad ...

Planetary Entry System Synthesis Tool (PESST)

PDF | A framework is provided for the propagation of uncertainty in planetary entry, descent, and landing.

The traditional Monte Carlo based dispersion analysis is overly resource-expensive for ...

Dispersion Analysis in Hypersonic Flight During Planetary

Mission Directorate (ARMD) Hypersonic Project is based on the fact that all access to earth or planetary orbit, and all entry into earth's atmosphere or any heavenly body with an atmosphere from orbit (or

Fundamental Aeronautics Hypersonics Project Reference Document

1 ADVANCES IN GUIDANCE, NAVIGATION, AND CONTROL FOR PLANETARY ENTRY, DESCENT, AND LANDING SYSTEMS Zachary R. Putnam* and Robert D. Braun Planetary entry, descent, and landing has been performed successfully at Venus,

(Preprint) AAS 16-092 ADVANCES IN GUIDANCE, NAVIGATION

Dispersion Analysis in Hypersonic Flight During Planetary Entry Using Stochastic Liouville Equation Abhishek Halder — and Raktim Bhattacharya Texas A&M University, College Station, Texas 77843-3141

Dispersion Analysis in Hypersonic Flight During Planetary

American Institute of Aeronautics and Astronautics 2 I. Introduction hypersonic vehicle such as a planetary entry capsule or a reusable launch vehicle, will experience vastly

Effects of Continuum Breakdown on Hypersonic

What is Aerothermodynamics? 8 Accurate and conservative prediction of the heating environment encountered by an Earth or planetary entry vehicle Aerothermal modeling is coupled and entwined with Thermal Protection System (TPS) design The TPS is designed to withstand the predicted environment with risk-

Lecture #1: Stagnation Point Heating - TFAWS 2017

Computational Challenges in Hypersonic Flow Simulations ... CA 94035 Peter A. Gnoffo , Jeffery A. White, and James L. Thomas NASA Langley Research Center, Hampton, VA 23681 Computational challenges in hypersonic flow simulations being addressed by the NASA ... Planetary entry vehicles are often designed with protrusions and cavities in ...

Computational Challenges in Hypersonic Flow Simulations

comparing disparate trajectory control systems for planetary entry and aerocapture vehicles. His research interests include hypersonic and space systems, GNC systems, flight software, and design

Integrated Design and Analysis of Guidance, Navigation

The main objective of this paper is to conduct computational analysis of a typical re-entry vehicles. Computational fluid dynamics is used to obtain the flow field that develops around reentry capsules flare shape in hypersonic flow. This problem is of particular interest since it features most of the aspects of the hypersonic flow around a planetary entry vehicle.

Computational Analysis of Hypersonic Flow Field Over Re

American Institute of Aeronautics and Astronautics 1 All-Particle Multiscale Computation of Hypersonic Rarefied Flow Eunji Jun*, Jonathan M. Burt and Iain D. Boyd Department of Aerospace Engineering, University of Michigan, Ann Arbor, MI 48109 Hypersonic aerothermodynamics for a probe entering a planetary atmosphere is an

All-Particle Multiscale Computation of Hypersonic Rarefied

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Hypersonic and planetary entry flight mechanics (Book

The book treats hypersonic flight trajectories and atmospheric entry flight mechanics in light of their importance for space shuttle entry. Following a review of the structures of planetary atmospheres and aerodynamic forces, equations are derived for flight over a spherical planet, and the ...

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University of Michigan Press, 1980 - Aerodynamics, Hypersonic - 357 pages. 0 Reviews. From inside the book . What people are saying - Write a review. We haven't found any reviews in the usual places. Contents. Preface . 1: Equations for Flight Over a Spherical Planet ... Hypersonic and planetary entry flight mechanics

Hypersonic and planetary entry flight mechanics - Nguyen X

Textbooks Recommended: Regan and Anandakrishnan, Dynamics of Atmospheric Re-Entry, AIAA Education Series, 1993. Bryson and Ho, Applied Optimal Control, Taylor and Francis Group, 1975.

AAE 590: Hypersonic Performance and Design

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Regolith-Derived Heat Shield for Planetary Body Entry and Descent System with In-Situ Fabrication ... planetary atmosphere. ... 14. Release Heat Shield after hypersonic entry, during Descent operations 15. Land on Mars 16. Launch from Mars to Deimos using ISRU propellants

Regolith-Derived Heat Shield for Planetary Body Entry and

Generally, NASA defines "high" hypersonic as any Mach number from 10 to 25, and re-entry speeds as anything greater than Mach 25. Among the aircraft operating in this regime are the Space Shuttle and (theoretically) various developing spaceplanes.

Hypersonic speed - Wikipedia

A Hypersonic Vehicle is a vehicle that travels at least 4 times faster than the speed-of-sound, or greater than Mach 4. A hypersonic vehicle can be an airplane, missile, or spacecraft.

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